



PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q62115

Hitoshi ISHIKAWA, et al.

Appln. No.: 09/729,195

Group Art Unit: 1774

Confirmation No.: 6703

Examiner: M. YAMNITZKY

Filed: December 5, 2000

For: ORGANIC ELECTROLUMINESCENT DEVICE

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Hitoshi Ishikawa, hereby declare and state:

I am a citizen of Japan;

I have the following experience and education:

April 1990-present: Central Research Laboratories, NEC Corp.;

April 1988-March 1990: Graduate School of Science and Engineering,
Shizuoka University;

April 1984-March 1988: Faculty of Engineering, Shizuoka University;

I am an inventor of the above-identified application;

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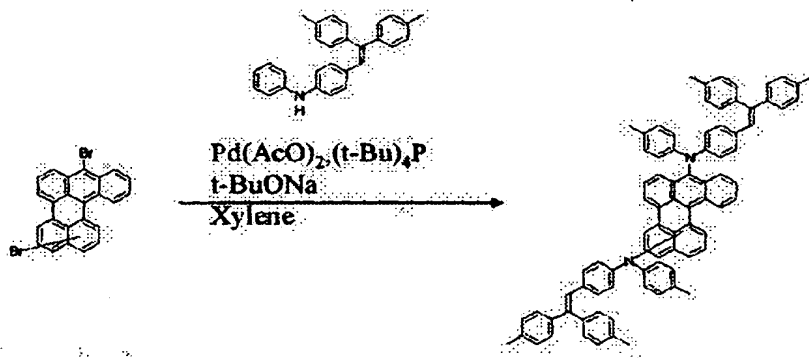
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I am familiar with the prosecution of the above-captioned application and am familiar with the disclosures of JP11-74079, JP11-185961, JP11-297473 and JP9-268284;

In order to distinguish the present invention and to demonstrate the unexpected superiority achieved by the present invention the following experimentation was carried out under my supervision and control;

Synthesis of Compound 1

Dibromobenzoperylene was obtained by bromination of benzoperylene with N-bromosuccinimide. The dibromobenzoperylene was converted to Compound 1 by reacting with 4-(di(p-tolyl)vinyl)diphenylamine in the presence of palladium acetate, tetra(t-butyl)phosphine and sodium t-butoxide in xylene at 120°C for two hours. The yield was 38%.



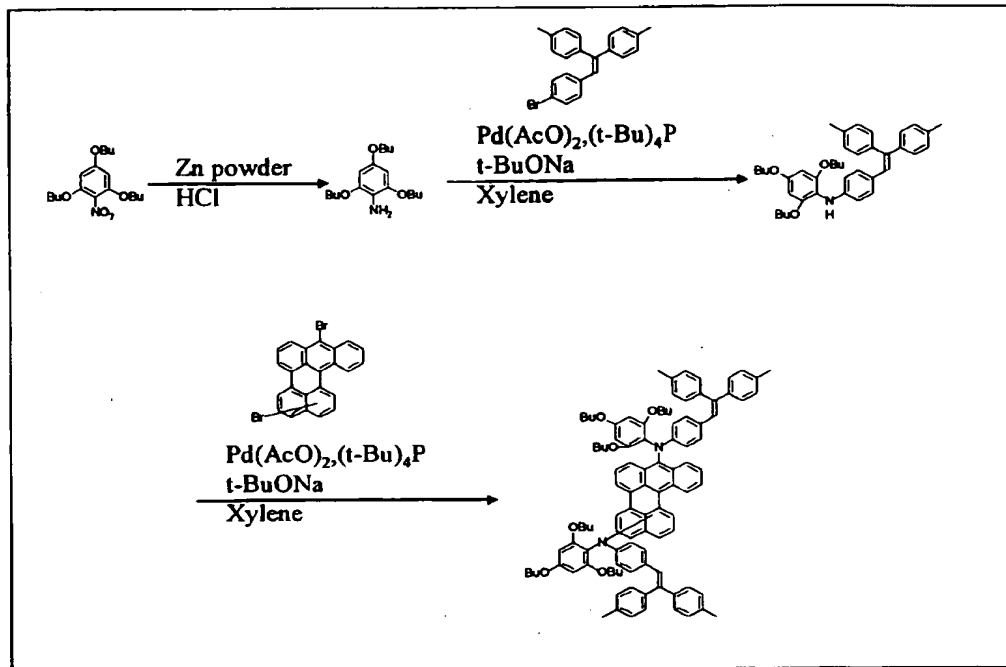
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Synthesis of Compound 2

2,4,6-tributoxyaniline was obtained by reduction of nitro groups of 2,4,6-tributoxynitrobenzene with zinc powder in hydrochloric acid. The 2,4,6-tributoxyaniline was converted to 4-(di(p-tolyl)vinyl)-2',4',6'-tributoxydiphenylamine by reacting with 4-(di(p-tolyl)vinyl)bromobenzene in the presence of palladium acetate, tetra(t-butyl)phosphine and sodium t-butoxide in xylene at 120°C for two hours. The 4-(di(p-tolyl)vinyl)-2',4',6'-tributoxydiphenylamine was converted to Compound 2 by reacting with dibromombenzoperylene in the presence of palladium acetate, tetra(t-butyl)phosphine and sodium t-butoxide in xylene at 120°C for two hours. The yield was 10%.

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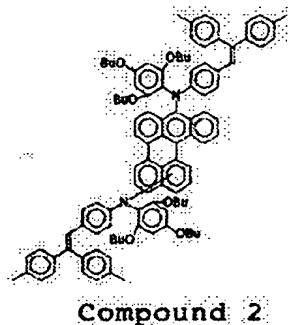
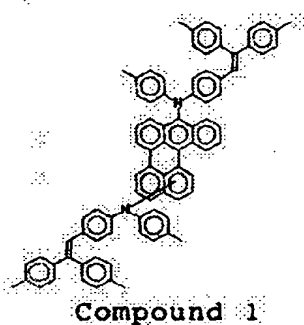
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Experimental Result

Compound 1 is a comparative example. Compound 2 is a inventive example having three butoxy groups at ortho- and para- positions of phenyl group bound to nitrogen. In both compounds, two diarylamino groups are linked to benzoperylene ring, and the bond position of the lower diarylamino group is unknown.

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An organic EL device prepared with a luminescent layer formed by using Compound 1 emitted light at 450 cd/m² in maximum brightness and 0.1 cd/A in maximum efficiency. An organic EL device prepared with a luminescent layer formed by using Compound 2 emitted light at 1710 cd/m² in maximum brightness and 0.5 cd/A in maximum efficiency.

These results mean that the ortho substituent reduces intermolecular interaction and causes 3.8 times of maximum brightness and 5.0 times of maximum efficiency.

From a review of the experimentation, I conclude that the results seen in the Inventive Example are unexpectedly superior to the results seen in the Comparative Example.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false

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statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: Dec. 23, 2002

Hitoshi Ishikawa
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